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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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ALEXANDRIA, VA 22314

EXAMINER
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DEPPE, BETSY LEE

ART UNIT	PAPER NUMBER
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2637

DATE MAILED: 02/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/726,533

Applicant(s)

MATSUNAGA ET AL.

Examiner

Betsy L. Deppe

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 08 November 2004 and 06 December 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

1. This Office Action is in response to the RCE filed December 6, 2004 and the amendment filed November 8, 2004.

#### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2, 4, and 6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The disclosure, as originally filed, does not describe "differential phase obtained by inverting the hard decision data" as recited in claim 2, line 9, claim 4, line 9 and claim 6, lines 9-10, respectively.

5. Claims 2, 4 and 6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which

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was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The detailed description does not appear to describe using a state having a **minimum or maximum** survival path metric to define reliability information as recited in claim 2, lines 5-8, claim 4, lines 5-9, and claim 6, lines 5-9. Although the disclosure describes using path metrics for determining reliability information, it does not appear to describe using a minimum or maximum survival path metric.

6. Claims 4 and 6 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
7. With regard to claim 4, the definition of "reliability information" on lines 5-9 differs from that in claim 3, lines 14-15.
8. With regard to claim 6, the definition of "reliability information" on lines 5-9 differs from that in claim 5, lines 17-18.

***Claim Rejections - 35 USC § 103***

9. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
10. Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in Figure 10 of the present application in view of Blasiak et al. (US

Patent No. 5,706,313 cited in the Office Action mailed March 3, 2004, Paper No. 3) and Herzberg (US Patent No. 5,996,104). Figure 10 in the present application discloses the claimed invention except for decoding based on the soft decision demodulated data. (See page 3, line 11 – page 7, line 22)

Figure 2 of Blasiak et al. discloses using a soft decision demodulated data estimating unit (201) and a decoding unit for decoding based on the soft decision demodulated data in a differential phase shift keying demodulator. (See column 3, line 18 - column 5, line 55) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a soft decision demodulated data estimating unit (as disclosed by Blasiak et al.) instead of the hard decision estimating unit in the admitted prior art of Figure 10 in order to improve the bit error rate performance of the demodulator. (See Blasiak et al. column 2, lines 52-58)

Herzberg discloses generating a soft decision equal to the product of a reliability data and hard decision data wherein the reliability information is defined as a difference between two of the survival path metrics on the trellis diagram. (See column 7, lines 22-26) Since Herzberg refers to a “survivor path” and a “path that has the closest accumulated metric,” it is a matter of designation to refer to these two paths as “survivor paths” thereby reading on the claim limitation. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the soft decision demodulated data estimating unit by multiplying the hard decision provided by the Viterbi Sequence Estimation Unit (530) in Figure 10 with reliability information in order to have a simple soft decision demodulated data estimating unit that requires

minimal calculations. Using minimal calculations for generating soft decision data minimizes the overall circuit size and power requirements.

Since the circuit disclosed by the admitted prior art in Figure 10 in view of Blasiak et al. and Herzberg includes using the Viterbi sequence estimation unit (530), the admitted prior art in Figure 10 in view of Blasiak et al. and Herzberg teaches using a trellis diagram and survival path metric as recited in claim 1, lines 6-12. (See page 3, line 11 - page 8, line 6)

11. Claims 3, 5, 9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art in Figure 10 of the present application in view of Blasiak et al., Herzberg, and Nagayasu et al. (US Patent No. 6,269,124 B1 cited in the Office Action mailed March 3, 2004, Paper No. 3). Figure 10 in the present application discloses the claimed invention except for a soft decision demodulated data estimating unit that estimates soft decision demodulated data based on a survival path metric, a power detection unit, a p-multiplying unit, and a decoding unit for decoding based on the soft decision demodulated data. (See page 3, line 11 – page 7, line 22)

Figure 2 of Blasiak et al. discloses using a soft decision demodulated data estimating unit (201) and a decoding unit for decoding based on the soft decision demodulated data in a differential phase shift keying demodulator. (See column 3, line 18 - column 5, line 55) It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a soft decision demodulated data estimating unit (as disclosed by Blasiak et al.) instead of the hard decision estimating unit in the

admitted prior art of Figure 10 in order to improve the bit error rate performance of the demodulator. (See Blasiak et al. column 2, lines 52-58)

Herzberg discloses generating a soft decision equal to the product of a reliability data and hard decision data wherein the reliability information is defined as a difference between two of the survival path metrics on the trellis diagram. (See column 7, lines 22-26) Since Herzberg refers to a "survivor path" and a "path that has the closest accumulated metric," it is a matter of designation to refer to these two paths as "survivor paths" thereby reading on the claim limitation. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the soft decision demodulated data estimating unit by multiplying the hard decision provided by the Viterbi Sequence Estimation Unit (530) in Figure 10 with reliability information in order to have a simple soft decision demodulated data estimating unit that requires minimal calculations. Using minimal calculations for generating soft decision data minimizes the overall circuit size and power requirements.

Since the circuit disclosed by the admitted prior art in Figure 10 in view of Blasiak et al. and Herzberg includes using the Viterbi sequence estimation unit (530), the admitted prior art in Figure 10 in view of Blasiak et al. and Herzberg teaches using a trellis diagram and survival path metric. (See page 3, line 11 - page 8, line 6)

However, the admitted prior art in Figure 10 of the present invention in view of Blasiak et al. and Herzberg does not disclose a power detection unit and a p-multiplying unit wherein the results of these units are used by the soft decision demodulated data estimating unit. Figures 4 and 7 of Nagoya's et al. teaches using a power detection unit

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and a p-multiplying unit wherein the results of these units are used by the soft decision demodulated data estimating unit. (See column 7, lines 10-24 and column 7, line 66 – column 8, line 4) It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the teaching of Nagayasu et al. into the circuit disclosed by the admitted prior art in Figure 10 of the present invention in view of Blasiak et al. and Nagayasu in order to further improve the bit error performance of the receiver.

12. Claims 8, 13, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. (US Patent No. 6,574,283 B1 cited in the Office Action mailed March 3, 2004, Paper No. 3) in view of the admitted prior art in Figure 10 in the present application, Blasiak et al. and Herzberg. Figures 2a and 3a disclose the claimed invention except for a receiver having a multiple differential phase detected signal output unit and a soft decision demodulated data estimating unit. (See column 1, line 48 – column 3, line 30)

As explained in the rejection of claims 1 and 7 above, the combination of the admitted prior art in Figure 10 in the present application, Blasiak et al. and Herzberg discloses the recited multiple differential phase detected signal output unit and the soft decision demodulated data estimating unit. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the circuit disclosed by the combination of the admitted art in Figure 10 in the present application, Blasiak et al. and Herzberg in the DQPSK demodulation circuit (13) of Sakoda et al. in order to



improve the bit error rate performance of the DQPSK system by using soft decision demodulation.

13. Claims 10, 12 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. in view of the admitted prior art in Figure 10 in the present application, Blasiak et al., Herzberg and Nagayasu et al. Figures 2a and 3a disclose the claimed invention except for a receiver having a multiple differential phase detected signal output unit and the soft decision demodulated data estimating unit wherein the soft decision demodulated data estimating unit that estimates soft decision demodulated data based on a survival path metric, a power detection unit, a p-multiplying unit, and a decoding unit for decoding based on the soft decision demodulated data. (See column 1, line 48 – column 3, line 30)

As explained in the rejection of claims 3 and 5 above, the combination of the admitted prior art in Figure 10 in the present application, Blasiak et al., Herzberg and Nagayasu et al. discloses the recited multiple differential phase detected signal output unit and the soft decision demodulated data estimating unit wherein the soft decision demodulated data estimating unit that estimates soft decision demodulated data based on a survival path metric, a power detection unit, a p-multiplying unit, and a decoding unit for decoding based on the soft decision demodulated data. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the circuit disclosed by the combination of the admitted art in Figure 10 in the present application, Blasiak et al., Herzberg and Nagayasu et al. in the DQPSK demodulation

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circuit (13) of Sakoda et al. in order to improve the bit error rate performance of the DQPSK system by using soft decision demodulation.

***Conclusion***

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Betsy L. Deppe whose telephone number is (571) 272-3054. The examiner can normally be reached on Monday, Wednesday and Thursday (8:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel, can be reached on (571) 272 - 2988.

**Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks  
P.O. Box 1450  
Alexandria, VA 22313-1450

**or faxed to:**

**(703) 872-9306**

Hand-delivered responses should be brought to Customer Service Window, Randolph Building, 401 Dulaney Street, Alexandria, VA 22314.

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Betsy L. Deppe  
Primary Examiner  
Art Unit 2637